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ORIGINAL ARTICLES.

SQUINT.—WITH SPECIAL REFERENCE TO ITS SURGERY.

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The object of this paper is briefly to cite a few points by way of argument in favor of advancement of the weaker muscle instead of tenotomy of the stronger one in the correction of most cases of strabismus, where surgery is the means resorted to, and also to make more widely known to my colleagues certain methods of operating, and their results, hitherto published, some not at all, and others to a very limited extent. As to the first proposition, what I have to say is the result of observations, I believe I may safely say, of several thousands of cases in the dispensary, hospital, and private clientèles of a number of prominent oculists in various parts of the world, to say nothing of those occurring immediately in my own practice; in all extending over a period of more than eleven years.

As to the second proposition,—the surgical methods re-

ferred to,—they are such, for the most part, as I have employed in several hundreds of dispensary, hospital, and private cases (to be somewhere near exact, about 325), upon which I have operated during the past six and a half years.

The squint in question is neither that latent kind, so often spoken of in recent years under the names of insufficiency and heterophoria, nor that which is the result of paralysis; though it is the writer's solemn conviction that for these, when surgery is indicated at all, the same means are the best that are best for squint in general; but it is with the commoner forms of convergent and divergent, idiopathic, strabismus we have now to do. Given in the order of their frequency, as I have found them, these are:

1. Convergent. (Constant and Monolateral).
2. Divergent. (Constant and Monolateral).
3. Convergent—Alternating.
4. Convergent—Intermittent.
5. Divergent—Intermittent.
6. Divergent—Alternating.

Those rarer forms of strabismus, such as sursum-vergent (turning upward) and deorsum-vergent (turning downward), we may here pass over with the mere statement that they are usually associated with convergence or divergence, and that they are particularly subtle and complicated.

Of all the terms with which modern ophthalmology is burdened, that of "convergent concomitant," as applied to the commonest variety of strabismus, is the most useless and misleading. Even as explained in the best text-books the phrase is inappropriate, from the fact that there we are told the eyes, in this form of squint, are both capable of all normal movements, but that they retain throughout said movements their relative position, or deviation; whereas, in examining such eyes we find, almost invariably, limitationof motility in the direction of that muscle away from which the eye swings; in other words, poor abduction in convergent, and poor adduction in divergent strabismus. Literally construed, this term would mean that both eyes squint at the same time. As a matter of

fact, normal eyes are always concomitantly convergent. There is no such thing among them as either absolute parallelism or divergence, at least as regards the axes of vision. Whether we look at one of the fixed stars, or at an object close up, these axes will meet at the object. It is true, however, that as regards the muscle which is at fault there is true concomitance. That in convergent squint we usually find weakness of both externi, and in divergent, of both interni. Indeed, we find in many cases that the squinting eye is possessed of the better muscular system of the two; the straight eye, in such instances having, however, the better vision or the lesser error of refraction, something sufficient to cause it to fix in preference to its more muscular fellow. But in every case, almost without exception, one eye fixes while the other deviates; only one eye is crossed.

As to the primary or essential cause of these usual forms of squint I may state, in few words, that I believe it to be found, as a rule, in the muscular system of the eyes; the faulty muscle being the muscle allowing the eye to turn. This muscle is from some cause put at a disadvantage, it lacks tone, it is inserted too far from the cornea, etc. It is a mistake, therefore, in my opinion, for instance, to consider the interni too strong in the crossed eye, and the externi too strong in the "wall-eye."

A great deal has been said about hyperopia as a cause of convergent strabismus, and myopia the cause of divergent, and it is doubtless true that they are factors, but I absolutely deny that they are prime factors. True, the great majority of squint cases are of the convergent variety, and most of them in hyperopic eyes. There are also a good many cases of hyperopia associated with divergence, and of myopia where exists convergence. I have myself observed a number of them. But it is also true that most of the eyes in the world are hyperopic. We see one hundred pairs of hyperopic eyes of all grades where we see one that squints. It is like the old question and answer, "Why do white sheep eat more than black sheep?" "Because there are more of them." Besides, a hyperopic eye is, in

certain respects, an undeveloped eye, whose muscles may, from the same cause, be prone to certain weaknesses. No one can consistently ignore the inevitable relation between the acts of convergence and accommation of the eyes, and the inclination to over-convergence caused by the excessive accommodative effort of hyperopic eyes. Neither can we be blind to the fact that all eyes, up to middle life, are possessed of what is known as "relative ranges" of convergence and accommodation quite ample to prevent squint, all things alse being equal. But all eyes cannot remain straight when handicapped by both errors of refraction and muscular weaknesses. Correct the one, and sometimes the other also yields. Hence it is, that probably ten *per cent.* of the cases of convergent strabismus in children, with fairly good vision in both eyes, will disappear by the aceurate fitting of convex glasses. It is my firm conviction that, given a pair of eyes with normal, well-balanced muscular systems, and their state of vision and refraction may be what it will, hyperopic, myopic, or astigmatic to any degree; blindness, partial or complete, in one or both, and there must be something wrong with the muscles which control their movements if they be not straight. As is well known, in squint the deviating eye is usually characterized by poor visual acuteness, often by scarcely any vision at all, this amblpopia being sometimes congenital, and sometimes acquired. Deprived thus of the power ot good binocular single vision, and there being a defect somewhere in the co-ordination of the lateral muscles, the worse seeing eye is allowed to follow in its own bent, as it were, and it swings into its position of greatest repose.

And this brings us to the point that there is, moreover, in the very anatomical arrangement of the eyes and their recti muscles a very good reason why the convergent should be the kind of squint most frequently met with. In observing the accompanying diagram (Fig. 1), borrowed from Landolt, who first pointed out the fact, my meaning will be readily perceived. We are accustomed to think of the eyes when in the position of greatest rest, *i. e.*, when their optic axes are directed straight

ahead, as if their recti muscles were directed straight backwards (or forwards, as one is a mind to put it), in the same line. Instead of this, as one may see, there is a decided angle between the direction of the long axes of the muscles and that of the optic axes. Approximately, 33°. So that, relatively speaking, there is already convergence when the eyes are straight. Hence, it would seem less unnatural for an eye to swing in-

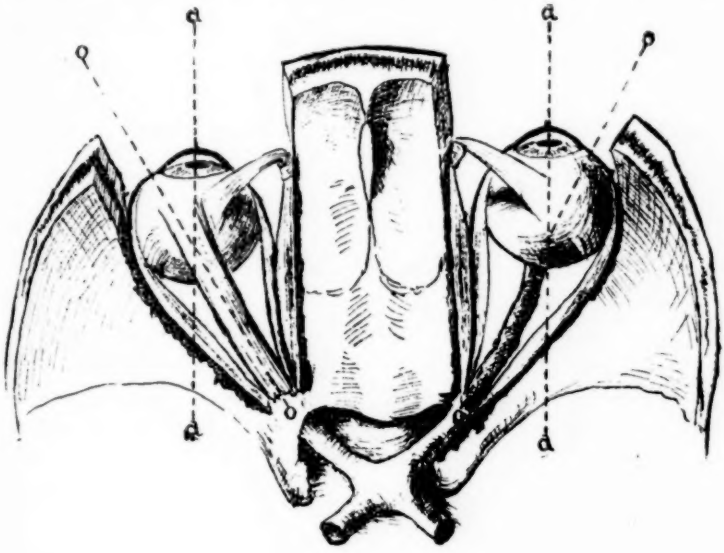

Fig. 1
aa Antero-posterior axes of globes — parallel
oo General direction of recti muscles.

wards than outwards. There being three recti muscles tending more or less to rotate it inwards, as against one whose action is in the opposite direction. Yet I read not long since in our leading American work on ophthalmology these words, "an eye so nearly blind that it wanders outward simply in obedience to the tendency impressed upon it by the outward direction of the axis of the orbit." [1]

[1] Noyes, "Diseases of the Eye," 1890, p. 173.

Herein, by the way, might lie the secret explaining some of the cases of divergence associated with high degrees of myopia. How easy for the long axis of this already elongated globe, enclosed by these diverging recti muscles, to fall in line with their long axes and be held there, looking outward.

In view of these facts, then, what would seem to be the rational, logical and proper operative treatment for the correction of squint? Should we cut off the tendon of that muscle towards which the eye deviates, a muscle already well adjusted, and none too strong, (and the tendon must be completely severed to get pronounced effect), allowing the muscle to slip back and become attached, nobody knows where, perhaps to nothing in particular, forever crippling motility in that direction, not improving it in the opposite direction, and disturbing the general muscular equilibrium of the eye? Or should we give our attention to the muscle actually at fault, that away from which the eye swings, and endeavor to give it greater power over the eyeball? This question, I, for one, have long since answered in thought, word, and deed. Experience and observation lead to the conclusion that a completely tenotomized muscle, if left alone, remains permanently disabled. Examinations of eyes whereon tenotomies have been made for strabismus almost invariably show one or two of three conditions, viz.,—continued squint of the original kind, squint of another kind, and limitation, or lack of motility in the direction of the operated muscle. They reveal, too, other deformities, such as retraction of the caruncle, and more or less protrusion of the globe. The worst of it is that these evil consequences are, in most cases, not speedily apparent; it may be months, and months, before they are fully realized, making prediction as to final position, and attachments of the tendon highly problematical, and the ultimate effects after tenotomizing most uncertain. Many of my advancements have been made on these very muscles that had been formerly cut away and snapped back like India-rubber, and the patient has come to have his second dose, and opposite kind, of squint, removed.

True enough, complete tenotomies can be made in certain

eyes, where the tendon is well wrapped in strong folds of capsule, provided these supports are left undisturbed, but eyes are extremely variable in this respect and it is very risky business. It is also true that there are, again, rare cases as, for instance, exaggerated turning of an eye, occurring mostly in older adults and elderly persons, the deformity having been of life-long duration, where there is really a shorting of the muscle towards which the globe is turned, and where a setting back of the tendon is not only advisable, but, at times, imperative. Among my operated cases occurs that of a lady past sixty, having convergence of 60° in the left eye, who sought relief from boring pain in the orbit of that side, and whose left internus was so short and unyielding that it was not possible, even with the aid of fixation forceps, and considerable force, to rotate the eye far enough outwards to bring the pupil to the median line Under such circumstances I have long been accustomed to make a curbed tenotomy; described later. But in very few of these exceptional cases is the tenotomy alone sufficient; for, to obtain good, lasting results, it must be combined with advancement of the opposing muscle.

As to partial tenotomies and button-holing, so long as they *are* partial, the result is apt to be only a temporary weakening of the muscle without permanently affecting the position of the eyeball, unless, perchance, the cutting be all at one side, in which event, there may be an abiding tendency of the eye to swing away from the cut border, up or down, as the case may be

On the other hand, properly advancing a muscle serves to increase its power over the globe, for obvious reasons. As Dr. Landolt long since observed, it gives the tendon a greater amount of rolling and unrolling on the eyeball. Apropos, I quite agree with this most finished oculist in what he recently said on strabotomy before the International Ophthalmological Congress at Edinburgh. Tests of motility of the eye in the direction of the muscle before and after advancement always show more extended movement due to the operation. The effect of a neat advancement is positive and lasting, while that

of a like tenotomy, no matter how carefully made, is prone to uncertainty. Another evidence of improvement of the muscles by advancement I have observed. Among my cases a number of them, after the operation, immediately chose to fix with the operated eye, although before the advancement this had been the eye that habitually squinted, and the remaining squint, *i. e.*, whatever amount was left uncorrected by the first operation, was transferred to the other eye. If this phenomena ever occurs after tenotomy I have never seen nor heard of it.

In this connection I may state, that while it is not generally necessary, for cosmetic purposes, to advance both the faulty muscles, it is, nevertheless, in order to obtain the best results, highly desirable to do so. However, I have great respect for the popular dread of aught in the nature of a surgical operation, so that where the squint is not too extreme, and the limitation of motility in the direction of the weaker muscle in the fixing eye is not too pronounced, I am willing to attempt correction of the deformity by advancement on the deviating eye alone.

If there chance to be among my readers those who fancy that it is a waste of the valuable space of this journal thus to urge a theme on which so much has been already said, I would have them cast their eyes about them somewhat, visit the eye-clinics, read the reports of eye-hospitals, familiarize themselves with the private work of other oculists, and I promise you, they will be surprised, yes, often astounded, at the great number of tenotomies and the great paucity of advancements, made for strabismus, in some instances actually made by men who admit the superiority of advancement to tenotomy. The last is so easily and quickly done, and with so little inconvenience to one's patient. One of the largest eye-institutions in the United States in its last report, gave two advancements and a hundred or so tenotomies.

As I said before, I try not to be a crank on the subject of operating. I exhaust all other means first. At the very beginning make a thorough and exhaustive examination of both eyes as to degree of squint, acuity of vision, state of refraction,

ophthalmoscopic appearances, motility and power of fixation in various directions, etc. Correct errors of refraction, advise as to general health, prescribe exercise of the squinting eye while the other is covered; gymnastics of weaker muscles, etc., whenever these things seem indicated. If glasses are fitted they are worn long enough before operating to give a reasonable time for spontaneous righting of the eyes.

The advancement operation I make—the fist single suture one of which I have any knowledge—is one I devised some six and a half years ago, a brief description of which was published in the AMERICAN JOURNAL OF OPHTHALMOLOGY—issue of 1889—but as there has been so much of refinement added to the various steps of the procedure in the interim, I desire to describe it anew. And I have been all along impressed with the idea that this is an operation pre-eminently dependent, for happy results, upon the very closest attention to minute detail, and wherein deliberation is a good second to precision. Such surgery cannot be successfully done after the style of the fourth pass of a fencing bout. I once knew a man who was wont to make tenotomies of recti muscles against time, and who plumed himself greatly upon his ability to cut a tendon smack, smooth off in forty seconds, by the watch. Now, however commendable, or otherwise, such practice may be, the operation here considered will not conform to any such *grand coup-de-main.*

The usual antiseptic precautions having been taken, the eye made numb by two or three drops of a four per cent. solution of cocaine—general anæsthesia being not only unnecessary, but highly undesirable, excepting in cases of very young children or extremely nervous people,—and held widely open by the blepharostat, the first step is usually the button-holing of the tendon of the muscle opposite to that which it is proposed to advance. This partial tenotomy is not calculated to produce any permanent effect upon the position of the eye, nor the strength of the muscle, but is for the purpose of breaking, for the time, the power of that muscle, so that it will not, by its dragging and tugging, prove a factor for the undoing of the

work of advancement. In making the button-hole one should expose the bare tendon, but avoid all needless traumatism, and be very careful to leave intact a few fibres of each border. It is in this connection that we have great cause to thank Dr. Stevens, of New York, for the small, delicate instruments he has given us for strabotomy. A number of times, however, I have left untouched the opposing muscle, especially when the deviation was slight, though, in one instance, there was convergent strabismus of 45°. Passing now to the advancement proper, the paiient is told to look far to the opposite side; with mouse-tooth forceps the conjunctiva, and only this membrane, is picked up in a vertical fold, well back of the insertion of the muscle; with small, straight scissors, slightly blunted at the points, a snip is made across the fold, precisely over the center of the tendon, and the incision, thus begun, is carried forwards horizontally till it reaches the margin of the cornea. After the conjunctiva, the anterior prolongation of Tenon's capsule is picked up and divided in the same way, then the episcleral tissue, if there be enough of it, is, in like manner, incised, so that a furrow is opened whose button is the naked sclera, and along which the cut tendon is to slide. By so doing one reaches the tendon by positive stages, neatly and discriminately, and avoids giving it an unguarded snip, which is possible with too heroic cutting. The tendon being now well in view, is slightly lifted by the forceps and a Stevens' hook inserted beneath it, as close as can be to the insertion; and not a great, lumbering hook shoved far back through the opening, point down, then made to turn a summersault somewhere in the orbit, giving the globe a vicious rake, and landing, point up, beneath the muscle. All such gouging and prodding behind the insertion tends to increase the extent of subsequent adhesion, hence, to lessen the efficiency of the muscle's action. No advancement forceps are put on, to chew up the tendon, an assistant holding the hook until the suture is placed. This last is a No. 1, braided, black silk, and is double-armed, *i. e.*, has a needle at each end. The needles are as fine as will barely carry the thread, and are straight two-thirds of the way from eye to point, from thence

slightly curved. Both needles are passed downwards through the tendon (see Fig. 2), at a distance from its insertion proportionate to the degree of effect desired, one near the upper, the other near the lower border, and the loop, or stitch, thus

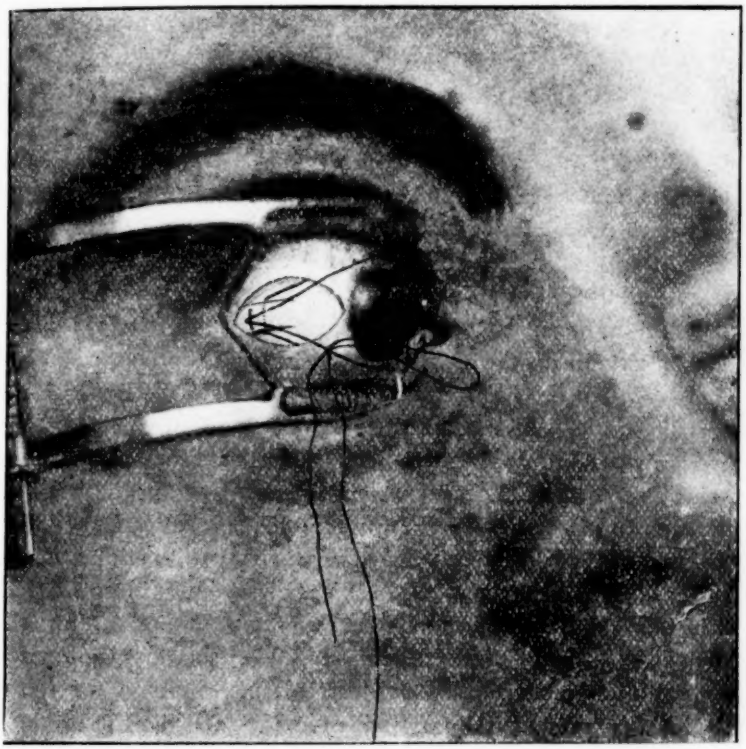

FIG. 2.

formed, is drawn down snugly upon the tendon (or, for the present, it may be left standing up somewhat—not drawn entirely down). Then, taking the upper needle in the holder, the conjunctiva and anterior capsule are lifted by the forceps, and the needle passed beneath these membranes, pretty well

forwards, then plunged into the episcleral and sub-capsular connective tissues, and plowed along until a point is reached opposite the vertical meridian of the cornea, and fully two to three millimetres from the limbus, where the needle is brought out. Precisely the same is done with the other needle below. Now, obviously, if the ends of thread were here tied the suture would lie across the cornea; instead, however, the upper needle is again placed in the holder and passed from behind under the loop, or stitch, that lies vertically on the tendon (see Fig. 2), and one must be quite sure that the needle really passes *under* the thread, and not *through* even the least strand or fibre of it, for this would cause a snarl in drawing up the suture, and do away with one great feature of this operation,—that of a perfect sliding pulley. To make sure, we would better include a little of the tendon here, or else leave the loop standing up a little so that we may see clearly what we are doing. It is better to make an invariable rule of using the upper thread for this step as, in the first place, the knot does not lie beneath the sensitive upper lid, and, in the second, the removal of the suture is made simpler and easier. The parts have now been threaded, so to speak, and we proceed to divide the tendon. The thread is got out of the way of the scissors,—if need be, held out of the way by an assistant, with a strabismus hook,—the hook beneath the tendon is taken by the operator, and, with very delicate scissors,—Stevens' are excellent for the purpose,—(slightly blunted, and curved on the flat) the tendon is completely severed. (See dotted line, Fig. 2). Next, the stump of tendon, at its insertion, is seized with the forceps, and cut off even with tho sclera. The latter step serves two very important purposes, it removes an obstacle to the sliding forward of the tendon, and prevents an unsightly lump at the site of the operation. Then, as to the tying, and tightening of the suture, several points must be closely observed One may have his assistant rotate the eye towards the muscle or not, but the patient should not be told to attempt such rotation. It is essential that the loop across the tendon should remain tightly drawn down, and to insure this, and at the same time obviate

any tearing up of the track of the suture where it is imbedded under the conjunctiva, take hold of the upper thread with the dressing forceps, and lower one with the fingers just where it emerges above and below the cornea, and pull, not back, in the direction of the advancing muscle, but away from it—in Fig. 2 towards the nose. Having, in this way, drawn the mus cle well forwards, the assistant "takes up the slack" of the end of the thread which passes beneath the loop, gives it to the operator, who lets go with his dressing-forceps, and ties the suture. After passing the ends through twice, in the usual way, the final tightening up is done,—and it probably is better here to have the helper rotate the eye towards the advancing muscle, but taking care to do so as nearly as possible in the horizontal plane. In this procedure one notes certain most commending features of this operation,—the tension being equal on all the thread-bearings, the advancing tendon is drawn neither up nor down, but comes forward in a straight, horizontal line, a line coinciding with that of the longitudinal axis of the muscle, and, consequently, with its action. This effect is next to impossible with a multiple suture operation. Moreover, the pull being from points so far forwards as the vertical diameter of the cornea, the maximum of advancement can be obtained, —that is, the cut end of the tendon can be drawn up to the margin of the cornea. Certainly no such degree of advancement can be accomplished by any suture, or combination of sutures, where anchorage is given the same in tissue lying between the cornea and the operated muscle. To get very decided permanent effect after advancements, one must, as a rule, strive for even more decided primary effect—even *over*-effect. As to the degree of primary effect I believe one must be guided solely by his judgment, for to attempt actual measurements and calculations as practiced by Schweigger, for example, seems to me, in view of the yielding nature of the tissues holding the thread, to be rather an absurd procedure; and, as I believe it best to *advance* the corresponding muscle of both eyes, in the great majority of cases, and not to materially *shorten*, the muscle by resection of all or the greater part of its tendon

—the cut end of the tendon must be got past the point of original insertion. I have demonstrated, in quite a number of my cases, that there was actual adherence of said end of tendon forward of said insertain. Following the example of Dr. Prince, I leave the suture tied in a long bow-knot, the shorter end of thread being always the one which controls the loop,—so that, after the lapse of twelve to sixteen hours, if, for any reason, there be occasion for modifying the effect upon the eye, the last part of the knot may be untied, and the suture either tightened or slackened, as desired. On first removing the bandage, whether one wishes to shift the suture or not, the long ends and loop of thread, which have been till now fixed by the dressing just outside the nearest canthus, are, before re-bandaging, cut off close to the knot. The suture is allowed to remain In the eye from five to eight days, the dressing being renewed during the time at intervals of about forty-eight hours. Only the one eye is ever bandaged. Not among the least of the advantages of this operation is the facility with which the suture may be removed. Strange to say, I have observed more nervous dread, and flinching on the part of patients relative to the taking out of the thread than to the making of the operation itself. One has merely to grasp the knot with delicate dressing-forceps, cut the thread to one side of the knot, it does not matter which, and it comes readily away. If the knot itself is not seized one risks attempting to pull the same through the tissues. The suture that holds the tendon also serves to close the conjunctival incision. So effectual, indeed is this closure, that I have never seen a granulation button here, while at the site of the partial tenotomy which accompanies the advancement, although the incision there is much smaller, the omission of a closing suture often results in a granulation tumor at that point. To end, in a few words, what I have to say concerning this operation, permit me to state that, in every case, the outcome has been most gratifying. Of these several hundreds of cases I have not seen a single eye that even threatened serious reaction. While, as before stated, I usually expect to make the second advancement before correcting the squint,

in only one instance was it necessary to make the third,—this in case of a young woman with excessive convergent strabismus (65°) associated with myopia of nine dioptries, all apparently of life-long duration. The externus of the deviating eye was so thin and weak that the ordinary advancement was not sufficient, so that, in making the second upon it, not only the tendon, but its aponeurosis also, was brought forwards, and with entire correction of the deformity.

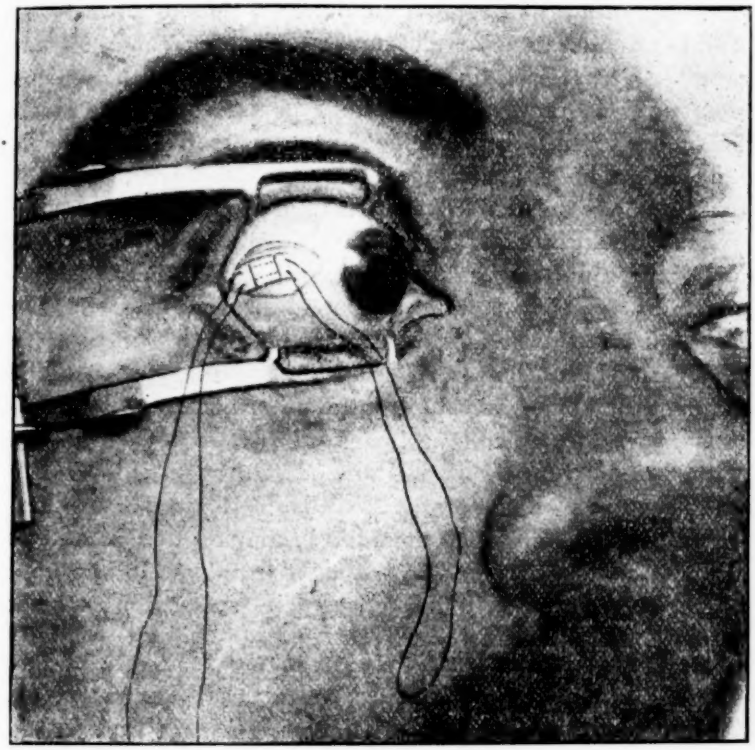

FIG. 3.

Figure 3 illustrates an operation I have hit upon within the past year, which is adapted to certain cases where shorten-

ing of the muscle, and not advancement is desired. (For it must be borne in mind that muscle shortening and advancement are not identical. The folding or looping, up of the tendon, so popular among certain eye-surgeons, both in this country and Europe, is a shortening and not advancement). Here also the suture is a double-armed one, the needles being of the half-curved variety, and very fine. The primary incision is the same as in the advancement, but less extensive. Here the advancement forceps must be used. This instrument fixes the tendon midway of the parallelogram included between the black lines (Fig. 3). The tendon is then divided at the point occupied by the black line nearest the cornea, and the forceps given to an assistant. Catching hold of the stump of tendon with mouse-tooth forceps the needles are passed down through the insertion, hugging the sclera, one near the upper, the other near the lower border. They are then carried beneath the tendon, without crossing the thread, and brought out, correspondingly, from below, and far enough back of the fixing forceps to insure a firm hold; the loop, however, is not drawn down, but is left very long, as shown in the drawing. Here the operator takes the forceps from the assistant and cuts the tendon st the point indicated by the other black line, thus resecting a portion. The long loop, and the two ends of thread are then tied in one knot, and the cut ends of tendon nicely butted together. The improvement claimed for this over certain other shortening operations lies in the fact that the thread embraces and supports the united ends of tendon both in front and behind, so that they are kept in nice apposition, and not inclined to stand up in a pout.

The curbed tenotomy, referred to further back, is similar to the advancement, though, of course, the object in this instance being to drop the tendon back a definite distance and there fix it, the thread is not carried forwards at all, but is brought out above and below in vertical line with or very slightly in advance of, the point where it is put through the tendon, and, obviously, as there is no cornea to avoid, the manœuvre of passing the upper end under the loop lying on the tendon,

is omitted. The tendon is cut at the insertion, and the muscle dropped back to the requisite extent and the suture tied.

There is much more that I would like to say concerning squint; in truth, I may say, as to the muscular anomalies of the eye in general, but then the paper would be far too bulky for publication in a journal—it should be in the form of a monograph. It should contain a systematic report of all my squint cases,—their histories, examinations, treatment, condition when discharged, and ultimately the whole arranged in condensed tables. It should go more thoroughly into the theory of strabismus, and should embody a description of certain original methods of experiment with the cadaver, on the ocular muscles *in situ*, and the deductions therefrom. I refer to the fixing of cords to these muscles at their points of origin,—the latter having been cut through,—and making study of the movements of the globe. If I mistake not, some one has recently told of doing something very much like this, a species of investigation which I instituted as long ago as 1890.

SOCIETY PROCEEDINGS.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Stated meeting, Thursday, December 13 1894; D. ARGYLL ROBERTSON, M.D., F.R.C.E., President, in the chair.

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FIVE CASES OF PLASTIC CELLULITIS OF THE ORBIT.

MR. GEORGE LAWSON read this paper. In four of the cases there was no pus, and in one a little pus was formed towards the end of the illness, and escaped through one of the exploratory incisions which had been made into the orbit Of the five cases three died, one required excision of the globe, and one recovered with impaired sight. The symptoms were pain in the orbit, œdema of the eyelids, and proptosis coming on shortly after the first symptoms, with increasing loss of sight; high temperature, from 101° to 107°. The symptoms rapidly increased in severity, the eyelids became purplish red, and œdematous, and the upper lid tightly stretched over the protruding globe. There was pain in the orbit, varying in intensity. If the symptoms were not relieved by treatment, the patient became delirious, then comatose, and died. In none of the cases had the patient received any injury, nor in any was there a trace of syphilis. In four of the cases the cellulitis was confined to one orbit, and in one there was cellulitis of both orbits. Four were women, and one a young man. Mr. Lawson's impression was that those cases were due to septicæmia, but in three he was unable to trace whence the septic

matter came. In Case III, the cellulitis of the orbit was preceded by acute tonsillitis, and to this was probably due the orbital cellulitis. In Case V, the patient was certainly suffering from pyæmia before the cellulitis of both orbits came on. She had a pyæmic rash on the face, high temperature, 103.4°, and pain in all her large joints; but the source from which the pyæmia originated could not be determined. Mr. Lawson said that in women he felt certain septicæmia occurred more often than was suspected from septic materials supplied from the vagino-uterine track; and he thought that some of the so-called rheumatisms, to which women were so much more prone than men, were really septicæmia, probably induced from this source.

MR. TWEEDY considered all such cases very grave. He had had a recovery in one case, seen by Mr. Lawson, which he attributed to a free division of the upper eyelid extending to the orbital margin; by this means the tension was greatly relieved, and the patient recovered. The swelling disappeared, and the movements of the eye, though at first very limited, eventually became free, and the sight almost normal. Since then he had had one other case in which he had made a similar free division of the upper lid; in this case there was complete recovery. In one of his cases there had been an operation on the lachrymal duct some time before, and in the other the nasal mucous membrane had been cauterized, and he attributed some importance to the fact of there having been a previous injury.

MR. HULKE thought it a pity that there was no necropsy in these cases; it was a question whether the orbital cellulitis was primary or secondary to a thrombosis of the ophthalmic vein or cavernous sinus, or to a meningitis He mentioned the case of a lady who had pyæmia after removal of her breast; there was thrombosis in the cavernous sinus and veins of the choroid. Some of the mild cases were the result of influenza or measles, and these mostly recovered.

MR. CRITCHETT had shown one case before the Society some years before; it was supposed to be due to retained mo-

lar teeth, and recovered after removal of the molars. He agreed with Mr. Tweedy that free division of the lid should be made.

DR. BRONNER had seen cellulitis of this kind after injury to the nose.

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HYDATID CYST OF THE ORBIT.

MR. LAWFORD read notes of this case. The patient, a girl, aged 17, came to the hospital in September complaining of pain in and around her right eye. There was moderate proptosis, with some displacement of the eyeball downwards and outwards; limitation of movements upwards, inwards, and to a less extent outwards; some œdema of lids and conjunctival congestion; V.=$^{6}/_{XVIII}$; optic papilla much swollen; retinal veins dilated and tortuous; a few small retinal hæmorrhages. The symptoms had been noticed for two months. All the above-mentioned conditions increased during the next ten days, and the patient was taken into the hospital for operative treatment. A deeply-seated tense tumor could then be felt behind the trochlea of the superior oblique, but there was no fluctuation. The tumor was cut down upon, and an exploratory puncture made with a syringe; perfectly clear fluid was withdrawn, and the tumor then collapsed; a larger incision was made and the cyst walls were seized with forceps, and a cyst about the size of a walnut easily withdrawn. The character of the fluid was those of a hydatid, but no hooklets, scolices, or daughter cysts could be found. The wound healed rapidly, and the displacement of the globe slowly gave way; its movements in every direction except inwards soon became normal, but probably from damage to the internal rectus during the operation the eye remained divergent. The swelling of the optic papilla quickly subsided, and vision was fully restored. Two months later there was no sign of recurrence of orbital growth. Mr. Lawford referred to the rarity of hydatids in the orbit and advocated early interference in these cases, before sight has be-

come irreparably damaged. The best plan, he thought, was to expose the tumor by dissection, then incise it, or draw off the fluid contents by a syringe or aspirator, and subsequently endeavor to remove the collapsed cyst through an incision enlarged sufficiently for this purpose.

THE PRESIDENT has had a case of this kind seventeen years ago, which he treated by puncture and removal. He thought the defect of movement in Dr. Lawford's case was due to an interference with the nerve supply rather than to accidental division of the internal rectus.

MR. ROCKLIFFE had had one case in which he had to excise the eye owing to the patient deferring the operation; the cyst was found to be suppurating.

MR. JOHNSON TAYLOR had had a case in which there was a cyst at the upper part of the orbit; it was a question whether it was a meningocele or not. It was tapped, and the fluid not being meningeal, the cyst was removed.

MR. LAWFORD, in reply, said there was some difficulty in distinguishing between a hydatid cyst and a meningocele, but it was always safe to tap the cyst and examine the fluid.

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OSTEOMA OF THE CONJUNCTIVA.

MR. HARTRIDGE read this paper. R. W., aged 3 months, was found to have a swelling at the outer part of the right eyeball, which was noticed three days after birth. It was diagnosed as a dermoid growth and was removed. It measured 12 by 6 millimetres, and consisted of a superficial soft part and a deep hard one, the latter being like an incisor tooth in form. On examination it was found to be bone covered by periosteum; in one part like an ivory exostosis, in another cancellous. It had not the proper structure of a tooth.

THE PRESIDENT had had a case many years ago exactly similar in position and appearance to the one now recorded.

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FORMOL AS A HARDENING AGENT.

MR. MARSHALL read this paper. Formol was introduced by Professor Leber; it was supplied under two names—formol or formaline. A ten per cent. aqueous solution of this was best suited for hardening purposes. If an eye was placed in this fluid for twenty-four hours it became perfectly hard, and could be cut easily; the eye retained its natural fresh appearance, the cornea and lens were transparent, the iris normal; blood and pus appeared unchanged, the vitreous was unaltered, and the retina and choroid remained *in situ*. There was no need to freeze the eye in order to cut it, as was necessary after hardening in Müller's fluid.

THE PRESIDENT thought as a hardening agent it was almost perfect.

MR. JULER had used it, and found it very satisfactory. In one case an eye had been put into a full strength solution by mistake, but it had not been harmed by it.

MR. LINDSAY JOHNSON had used it before Leber introduced it, but had given it up, as he thought some other agents were superior. Formol precipitated metallic silver from solutions of its salt; and, in this way, by precipitating silver in the tissues, it might be very useful.

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PAPILLARY CONJUNCTIVITIS.

DR. ADOLF BRONNER (Bradford) read notes of a case of papillary conjunctivitis of the left eye due to the prolonged internal use of arsenic. The patient a youth of 22, suffered from chronic eczema of the skin. In July he began to take arsenic, in pillules of one milligramme. For two months he had been taking twenty-four pillules daily; the eyes then became red and very irritable. There was a peculiar slight œdematous condition of the conjunctivæ and of the lids. Boric acid lotion and cocaine drops relieved the symptoms temporarily. In two weeks the patient returned. There were pinkish, small, hard,

irregular papillary growths of conjunctiva and of the left upper lid, most marked at upper end of tarsus. In spite of the local application of sulphate of copper, the growths did not seem to diminish for fourteen days. The arsenic was then discontinued, and, under treatment, the growths subsided greatly. The use of arsenic frequently gave rise to conjunctivitis, but there were no cases on record in which papillary growths had formed.

THE PRESIDENT thought it very problematical that the arsenic was the cause of the papillary growths; if it had been so they would probably have come in both eyes.

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CARD SPECIMENS.

MR. LANG—A Case of Cataract with Crystals in the Lens, with Microscopic Specimens.

MR. H. WORK DODD—(1) A New Pince-nez; (2) A Case of Congenital Lens Opacity.

DR. BRONNER—(1) Wire Shield for Use after Cataract Operations; (2) Benno's Writing Paper with Raised Lines for the Use of the Blind.

MR. G. LINDSAY JOHNSON—(1) Removal of Lens in a Case of Myopia; (2) Symmetrical Markings in a Case of Lamellar Cataract.

MR. N. C. RIDLEY—A Case of Congenital Coloboma in the Macular Region.

MR. W. J. CANT—Large Sarcomatous Tumor on the Right Side of the Brain.

MR. DONALD GUNN—Case of Tuberculous Iritis.

SELECTIONS.

A CASE OF EXOPHTHALMOS IN AN INFANT OF THREE MONTHS.

BY HARRIET E. GARRISON, M.D., DIXON, ILL.

The patient whose case forms the basis of this article, is the elder of twin boys, born June 30, 1893. This was the mother's third confinement. The labor was normal. The delivery of No. 1 was retarded by vertex presentation. He preceded his brother by forty minutes, weighed eight pounds, and No. 2 weighed nine pounds. No 1 cried lustily and to all appearances was as strong and vigorous as No. 2. He was warmly wrapped in flannel and placed on his right side. After the third stage of labor was completed, and the mother was made comfortable, as I had but the assistance of an untrained nurse I looked after the children. I found the nurse bathing No. 2, and No. 1 lying as he had been placed at birth, but he had become blue and the extremities cold. In an hour's time by the application of dry heat and hot water internally he had lost the blue color and the hands and feet had become warm. When I saw him twelve hours afterward I could not distinguish him from No. 2, but the attendant said he required more care to keep him warm and comfortable than No. 2, which condition continued. It was two months, August 29, before I again saw the children. Then No. 2 was very sick with cholera infantum. At this time No. 1 weighed nine pounds and No. 2 eleven. On the next day No. 1 showed choleraic symptoms. No. 2 had much the more severe attack of cholera infantum but No. 1 was harder to treat. In a few days No. 2 was rosy

and vigorous while No. 1 continued to have gastro-intestinal troubles. September 27 the mother brought the babies to my office. No 1 was very much emaciated not weighing as much as at birth, but the most marked symptom was the protrusion of the eyeballs—they were apparently being pressed from their sockets. The mother said she had not noticed this condition until a few days previous. At this time I first noticed tachycardia, the pulse ranging at 240 per minute. The next week he was again brought to my office. The protrusion of the eyeballs was not as marked as the week before, but there seemed to be no change in the tachycardia. At this time, the mother thinking No. 1 would not live had them photographed. They are arranged to hide the protrusion of the eyes of No. 1 but it can still be seen. From this time on he continued to improve and in two months the mother told me he weighed fourteen pounds against sixteen for his brother. December 30 the mother again brought him to my office as he had been sleepless, cried a great deal, and his head was hot. He had two lower incisor teeth and the upper gums were very red and much swollen. At this time the mother called my attention to the tumultuous heart action. She said she had noticed it for several weeks, sometimes more violent than others. While in the office the beating was sufficiently violent to shake the clothing over the chest. The pulse rate was now 180 per minute. A careful examination of the heart showed nothing abnormal except the thrilling motion. In January he had a severe attack of la grippe with brain symptoms which continued 9 days; pulse 200, temperature 103° F. In the ninth month the pulse was 150, of good volume. The only difference discernible in the twins at this time was the pallor of No. 1 and the staring of the eyes. At the present time in the eleventh month, No. 1 is rosy and hearty looking, has lost the pallor and staring of the eyes, pulse 100, of good quality, creeps actively but does not climb, and stands as much as No. 2. No. 1 weighs nineteen and one-half pounds; No. 2, twenty-one and one-half pounds. No. 1 has all his incisor teeth; No. 2 has six. At this time the children were again photographed. In the photo-

graph the laxness of the muscles of No. 1 is very noticeable as he does not sit nearly as erect as No. 2. His mother tells me his head perspires when he sleeps.

Exophthalmos, Graves' disease, exophthalmic goitre, Basedow's disease, struma exophthalmia, tachycardia strumosa, cardio-thyroid exophthalmus are some of the names which have been applied to this disease—which usually has three prominent symptoms; tachycardia, exophthalmos and goitre.

Graves was the first to distinctly group these symptoms, but gave most prominence to tachycardia and exophthalmos. Then later, Basedow more fully described the symptoms, but made the goitre more prominent. Tachycardia is the first symptom usually observed; the other two varying in different individuals, sometimes the exophthalmos appearing first and sometimes the swelling of the thyrioid gland. In this case the exophthalmos was the first symptom noticed. A mild tachycardia very likely existed before the child was brought to me, but the tumultuous heart action was not observed until nearly two months later when the exopthalmos had nearly disappeared, and at no time was any swelling of the thyrioid gland observed. This agrees with a case recorded by Graves in which tachycardia was first noticed, then exophthalmos and two months later the thyrioid swelling. Improvement began in my case so soon that the thyrioid gland did not become involved.

I have now under my care a girl of 14, with goitre. The pulse is 120 with chlorotic bruit. The murmur is very marked over the carotids and thyrioid. The patient's eye's are prominent but not protruding. In another young lady with well-marked goitre of right lobe the pulse was never over 120. Exophthalmos came on suddenly while she was being treated for goitre by electricity; the exophthalmos was relieved by treatment but the eyes still looked large. The goitre was but slightly reduced by treatment and is still noticeable at the present time, although she now seems perfectly well and is the mother of several healthy children.

CAUSE.—There was never any case of goitre among the children's ancestors, therefore heredity could be excluded.

The parents are both large, vigorous and healthy, of German descent. The grandparents are living excepting the paternal grandfather who died of acute pneumonia. The house in which the children live is one of the oldest in this section of country. It is locoted on low land near a small stream which at this point is quite sluggish. The difference between the air on the highlands and the lowlands was very noticeable as I drove down from the surrounding hills in the early morning hours on the day of the children's birth. Although it was very warm June weather the air in the house felt damp and cold, and I directed a fire to be lighted by which the children might be dressed. It is to this unsalubrious situation that I attribute the child's condition; weaker at birth than his brother he could not overcome the unfavorable climatic conditions. Why it should take the form of exophthalmos can perhaps be accounted for by the condition in which the child was an hour after birth. The venous stasis and coldness of the extremities showed a weakness somewhere in the child's system. It could not have been organic heart trouble or it would not have been so quickly relieved by the application of heat. There must have been a weakness of the nerve centres, which control the generation of heat and the vaso-motor nerves. This accounts for the failure of the child to rally from the attack of cholera infantum as this had farther injured the already weak nerve centres. Whether this condition was caused by the pressure on the brain from the vertex presentation or whether it was caused by a defect in nutrition during fetal life, I am not prepared to say.

TREATMENT.—The child had been taking almost continually, from the time it had the attack of cholera infantum, medicine to assist digestion and to tone up the system. As soon as I saw the child had exophthalmos I gave, in addition to the medicine it was already taking, arseniate and strychnia. A granule containing $^{1}/_{134}$ of a grain was dissolved in nine teaspoonfuls of water, and one teaspoonful of this solution was given every six hours. This was given regularly for a long time and was resumed as soon as the brain symptoms of la grippe were

controlled. The arseniate is giving as favorable results in the case of chlor sis now under my care. She has been taking it for a month, the pulse rate has decreased to 90 and the goitre is materially reduced. She takes $^1/_{67}$ of a grain every four hours.

DIET.—The mother having very little breast mild I gave in addition sterilized milk, and as is usually the case, when babies are given the bottle, the children soon became weaned from the breast and the sterilized milk formed the whole diet. After the attack of cholera infantum they were given condensed milk. This agreed perfectly with No. 2, and he has never been under treasment since, but did not agree with No. 1 and he was given, in addition to condensed milk, beef extracts and several infant foods. At the time of the exophthalmos, he was put on peptonized milk for a few days but was soon returned to condensed milk. After the attack of la grippe he was given sterilized milk which at the present time with bread and butter forms the diet, No. 1 consumes double the quantity of milk which No. 2 requires, but does not increase in weight any more rapidly than No. 2.

All the cases of exophthalmos or goitre which have come under my observation before this case, have been in females at puberty or later, for which reason I have always regarded tachycardia, exophthalmos or goitre as being a symptom or symptoms of reflex nervous origin—the uterus and its appendages being the source of irritation. But since studying this case, I have reached the conclusion that the disease is located in a sympathetic ganglion or ganglia, and the disease of the other organs is due to loss of proper nerve stimulus. And the proper treatment of these conditions is to increase the nutrition of the nerve centre.—*Journal of the American Medical Association.*

REPORT OF THREE CASES OF MONOCULAR HÆMORRHAGES OF THE RETINA.

BY HOWARD F. HANSELL, M.D.,

Adjunct-Professor of Diseases of the Eye, in the Philadelphia Polyclinic; Chief Clinical Assistant in the Ophthalmological Department, Jeffe son Medical College Hospital; Consulting Ophthalmologist to the Chester County Hospital.

CASE I.—Mrs. Z., widow, aged 48, noticed, in the early summer of 1893, the vision of the left eye became suddenly impaired to such an extent that she could perceive only the outline of the largest objects. Alarmed and distressed, she consulted the nearest available practitioner, who made light of the symptoms, and advised tonics and rest of the eyes. Finding V. did not improve, she shortened her vacation, and consulted me in August. At that time V. was reduced to counting fingers at five feet, media clear, no external evidence of disease, the optic disk moderately swollen and its edges indistinct, the retina infiltrated in the neighborhood of the fovea and nerve with numerous small hæmorrhages, the arteries of normal size, the veins tortuous, and both interrupted many times in their length by the extravasations. The retina was œdematous and hazy. The right eye was free from all disease. V.=$^{6}/_{VI}$.

There was no evidence of constitutional disease, nor did the patient make any complaint of her general health. Indeed, she had been unusually free from annoyances both mental and physical, during the past year, and had gained in weight. She was, however, in the midst of the menopause, and in the absence of any other cause, it is proper to conclude that this condition had some influence. During eighteen months of oc-

casional observation by the ophthalmoscope, I have not detected any material change in the retina, although for a day or two at a time Mrs. Z. says the sight is better, and then it falls back again. The treatment, carried out by Dr. George R. Morehouse, has been a restriction of the diet to easily digestible food, tonics, and small doses of potassium iodide.

CASE II.—Mr. D., aged 65 years, an apparently healthy man, leading largely an out-door life, a moderate eater, and abstemious in the use of alcohol and tobacco, short and stout in build, and of florid complexion, consulted me September, 1893, complaining of dull pain over the left eye in reading. He had likewise noticed that he could not see quite as well with that eye as with the other.

Examination of the left eye showed: small pupil responding feebly to light and accommodation, dilating to only one-half the size of the right when homatropin and duboisin were instilled into both; cortex of the lens opaque, media otherwise clear; disk hyperæmic but not swollen; numerous small hæmorrhages scattered throughout the disk and foveal region of the retina; field limited below; V.=$^{6}/_{XII}$. Examination of the right eye showed: small and responsive pupil; lens opaque in its cortex; eye normal in all other respects.

The knee-jerks were absent. There was no albuminuria.

During the next fifteen months the vision of the left eye slowly deteriorated, until, in December, it was reduced to perception of moving objects in the lower field. The retina gave a dim reflex from the upper periphery, while the rest of the eye-ground was absolutely black, probably from extensive hæmorrhages into the vitreous. The opacity of the lens had increased slightly, the pupil was responsive, tension normal, no pain or injection. The urine had been repeatedly examined with negative result, and the heart was normal in its action. Mr. D. had pursued his usual occupation of inspector of locomotives without interruption, and beyond the loss of vision of the left eye. suffered from no disability.

The treatment was entirely general. I could assign no cause for the retinal and vitreous hæmorrhages other than

weakening of the coats of the retinal blood-vessels and general indications of venous cerebral congestion.

CASE III.—Mrs. W., aged 60, was brought to me by Dr. Frank Woodbury in December, 1893, on account of sudden partial loss of vision of the left eye, discovered accidentally one month previously. At the time of my first examination, V.=$^{6}/_{XXXVI}$; there was large, central, irregular outlined scotoma, caused by fresh hæmorrhages in the retina, extending downward and outward from the fovea, and involving the latter. The blood-vessels in that region were, in part, hidden from view by the extravasation, and, where visible, were normal in size and course. The papilla was not inflamed or even hyperæmic, its edges and excavation were well defined. The eye was normal in all other respects. V $=^{6}/_{VI}$ and no disease.

Dr. Woodbury made an exhaustive examination of the physical condition, but was unable to ascribe a cause for the retinal hæmorrhages. The urine showed an excess of phosphates, but no albumin or sugar. The progress of the affection in this case is unknown.

The three cases above recorded have several points in common: the monocular limitation, the insignificant involvement of the optic nerve, the apparently perfect health of the patients, the difficulty of determining a cause, the fruitfulness of treatment, the fact that all had passed middle life, the freedom from complications, and the continued good health for months after the onset of the symptoms. Such cases are properly termed "apoplexy," and not "hæmorrhagic retinitis," are analogous to cerebral apoplexy, and depend, in the majority of cases, upon calcareous or other degeneration of the blood-vessel walls, with or without heart disease. Under ordinary conditions of the daily life, when no unusual pressure is brought to bear on the walls of the vessels, their strength is sufficient; but excitement, anger, grief, shock, constipation, disordered digestion, or any departure from the uneventful routine of existence, is a sufficient cause to determine a rupture of the walls of a retinal vein or artery. The difficulty of determining by the ophthalmoscope a break in the continuity of the vessels

has led to the belief that we are not dealing in these cases with true extravasation but with a diapedesis, and the great number of the splotches of blood, their dissemination, their independence of the proximity of a vessel, and, indeed, their predilection for the neighborhood of the fovea, where the visible vessels are notably scarce, seem to favor this view. It is worthy of remark that, although more than a year has passed since the first observation of the hæmorrhages, and although the disease attacked but one eye, there has been no evidence of increase of tension (glaucoma), nor has any of the patients suffered an apoplexy of the cerebral vessels, of which retinal hæmorrhage is said to be often the forerunner.—*Philadelphia Polyclinic.*